



Chambers's Journal

SIXTH SERIES.

AT THE MAKING OF CANADA.

By ISABELLA FYVIE MAYO.

IT is interesting to remember that one of the most flourishing districts of Canada — the tract lying between Lakes Ontario and Huron — was first settled (about seventy years ago) mainly by a little group of Scotchmen of the 'literary period' of Edinburgh. John Galt, the famous Scottish novelist, was also the founder and acting right-hand of the 'Canada Company.' The scheme had many of the defects of all such schemes.

But the Canada Company was an immense improvement on what had gone before.

Bell, the historian of Canada, tells us that British governmental favouritism had appropriated to itself 'whatever of Canada had been hitherto explored.' He says: 'Between the years 1793 and 1811 more than three million acres of this territory had been shared among a couple of hundreds of lucky grantees. . . . None of the monopolists of all this soil had the slightest intention of turning it to account by proper cultivation. As it cost them nothing, or something the nearest to nothing, the acquirers concluded to let it lie as it had lain for countless ages, till minor acquisitionists should clear their small soils (or spoils), open up roads, &c., and then the huge expanses of corruptly-appropriated wilderness would of course become "worth money" to parties hitherto unseen, who would then boldly come forward and peremptorily claim "their own."

The powers of the Canada Company were not all of this mere capitalist order. The Edinburgh literary men come out well in the matter. First and foremost, John Galt himself lived some time in Canada and put his whole heart into his work, whatever may have been his errors or mistakes. Partly, as it seems, on the very score of his literary gifts, he was somewhat mistrusted and hampered by certain of his company's directors. It seems hard for the average man, with no single 'talent' of his own, to conceive that some favoured individuals may actually have more talents than one!

The log-hut which Galt erected for himself in

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Guelph, Ontario, in 1827, still stands, the building being now, we believe, in some way utilised by the Pacific Railway. In his pioneering days Galt is described as 'a fresh-coloured, splendid-looking man, almost six feet four, with a frame in proportion. Not a talkative man; but, when questioned, clear and courteous in his replies.' There is probably a graphic portrait of him in his own little boy's remark: 'Papa is the biggest boy I ever knew.' A lifelong friend wrote to him: 'Were we words instead of men, you would be a verb active, with a strong, optative mood.'

Another literary Scotchman, whose strenuous influence on the Canada Company was exerted till his day of death, was 'Tiger' Dunlop, a medical man who had earned this sobriquet by his prowess in freeing an island of the Ganges from tigers. As John Galt, so William Dunlop, was a West of Scotland man and an Edinburgh littérateur. They were both 'sons of Anak' — Galt with 'a stoop in the shoulders,' Dunlop with a shoulder-measurement of two feet eight. Dr Dunlop, with his brother the captain, settled in Canada, and both of them lived and died there.

John Galt calls Dunlop 'a large, fat, facetious fellow of infinite jest and eccentricity.' They 'dived into the woods together.' Dunlop wrote to his sister in 1827: 'We have had a most laborious journey seventy-two miles through the woods, but have been rewarded by coming into the most beautiful country in Canada.' This was the district between Lakes Ontario and Huron. It was filled with wolves then; they did not begin to disappear till the steam-mills were started. As late as 1859 a young wolf was killed within fifty yards of a farm door. In 1890 we spent a pleasant afternoon with a fine old dame who had lived through those early days and knew what it was to shut herself and her little ones into the shanty and sit listening to the howling of wolves between the little family group and the returning husband and father. Another mother stood listening to a fierce wolf-fight, knowing that her children were on their way from school. She blew the big

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horn to scare the beasts, and the children got home safely. It was found that the wolves had been struggling over a dead deer. It is said that the children went to school next day.

About Stratford and Guelph, now beautiful and prosperous towns in smiling agricultural districts, the woods were then so dense that in summer the sun was hardly visible, and the persistent gloom surrounding the little clearings was terrible to bear, and was sometimes not borne without pitiful results. The house whose clearing was large enough to afford sight of the widest space of blue sky was, we are told, the most popular house to visit.

Early settlers expect hard times, and the Canadian settlers got them. It was a time of much emigration from disaffected Ireland and from the Highlands of Scotland, over which deer-forests and sheep-farms were beginning to sweep. There was also quite another type among the settlers—retired officers and those on whom the great pressure in the middle-classes was beginning to tell, and families with small capital which they hoped might lay the foundation of fortune in a new country. Perhaps it was safest to go out poor. A wealthy old settler who went out as a boy in service, and saw his master and his master's friends disappear, their means wasted and their lives futile, has pertinently said: 'Sure they all had money, but few of them had any sense, and none of them knew how to work.' That knowledge was by far the best of capital.

Some of those who had been most homesick in Canada lived to be homesick for Canada. As years passed by many of them fulfilled what they had felt to be the desire of their hearts and returned to their native land. One old Scotchman who went back to Scotland declared he could see nothing there but smoke! No efforts of kind relatives could give revisited scenes the charm which they had had in memory. He soon decided 'that he would rather starve in Canada than live in Scotland in affluence.' An old Scotchwoman also sought her early home. Her report was: 'She didn't just like it. Auld friends were dead.' The homeland had now become the land of exile. Her health visibly and rapidly failed. She went back to Canada and survived, happy and stirring, for years afterwards.

'The whisky-bottle, the society of those they regarded as inferiors, but who were destined to become their superiors, disappointment, loneliness, and despair, turned many into poverty-stricken drunkards. Whisky and wet feet destroyed more promising young men than ague and fever.' Such is the summing-up of one who has listened to many old settlers' tales.

In view of such awful possibilities, one wonders how anybody could make himself responsible for saying 'Come,' save in the strictly veracious, well-weighed words of one correspondent of this period, who wrote: 'Do not leave your country unless obliged. If you be so, come to Canada. Persevere, and you will attain a comfortable mediocrity.'

We know the history of one German family who settled in this district in those days. Scarcely had they reached their destination when the father and children developed smallpox, which they had contracted on their outward journey. They lay in an outhouse. The sole ministrations devolved on the poor wife—food being supplied by other settlers. After the illness had passed away (without fatal results), a log-hut was built, but it was, during the absence of the master, accidentally burned to the ground—the fire consuming their big chest, brought from 'the Fatherland,' containing sets of carefully-prepared clothing provided against many coming years. Yet in the end they prospered. It was one of this family, or one of their first neighbours, who immediately on his arrival planted a privet-hedge around his hut, and lived to see it such as would do credit to a British manor-house—a most dignified feature in the well-planned garden which now surrounds the pretty homestead with which his descendants have replaced the shanty.

Middle-aged Canadians of to-day, who were the little ones of the pioneer families, are often heard to say, 'Father lost heart, but mother kept us together.' It is said that the refined and educated women seemed the best able to accept the roughness and loneliness of their new homes. Possibly, neighbourly gossip meant less to them, and they may have had more resources in the way of home-made house-decoration and floriculture. Or they may have better known how to keep silence. They rocked their children 'in a long, bath-shaped affair, the head of it being a flat seat where the mother sat, so placed that the child rocked with her, and as she rocked she sewed.' Where the villages were springing up they made neighbourly festivals of washing-days or baking-days. They did miss their tea when that commodity failed them. But withal they called themselves happy 'if they could but have kept the babies'—a plaintive cry constantly heard, especially after 1832—'the cholera year.'

There must have been many sad histories among those brave, patient women. Few could be sadder than that of Mrs Kippen, by birth a Highland Grant. She was a widow, and she started out to Canada with her four boys. She soon found that the conditions of the country would not fulfil her hopes for the lads. On her appealing to influential friends at home, other openings were found for the boys—in Africa, Afghanistan, and India. Even the youngest, who remained in Canada, died far away from her. She lived on alone in that strange land, earning her own living as housekeeper to Galt's son. It is said that she never murmured. But once she was found with streaming eyes, an open book lying before her. It was Mrs Hemans's poems, open at 'The Graves of a Household.'

Owing to the class of immigrants who came—and to their ignorance of the conditions to which they came—strange things were sometimes found in wilderness dwellings. Old blue china, beautiful damask, and family silver were to be seen upon the

table of a home by whose fireside lay a sick calf, and not far off an ash barrel full of half-made soap! A setting hen would find safe refuge under a piano, upon which two other hens would roost for the night. In the fields, clad in short bedgown and petticoat, the mistress had spent her morning wielding the pitchfork, but after dinner she would take her harp and accompany her daughter on the piano and two German neighbours on their violins! This girl-daughter, armed with an axe, had slain a wolf which attacked the house-dog. 'She played the piano beautifully.'

One who knows Canada well says that it owes much to the cultivated people who were among its early settlers: even to those who, being unable to adapt themselves in their new circumstances as did those we have just described, must be regarded as failures. For in a country where schools were sparse, where there were few books and unceasing manual labour for young and old alike, it was no small good fortune to have inhabitants with refined manners and wider horizons of experience and memory. Such kept up a stock of traditions, which were restored to living form as soon as circumstances would permit.

The two Dunlops—the doctor and his brother the captain—appear to have had all the common faults of the period—were heavy drinkers, and indulged in rude and even cruel practical jokes. Yet their coarseness of nature was evidently pervaded by finer fibres. Nay, possibly these were wholly fine natures fallen on rough days and ways. Nothing looks more melancholy than a rose drabbled in a gutter. Yet it remains a rose.

We can discern something of Dr Dunlop by the epithets bestowed on him. With those who heard him lecture he was 'this very able and gifted man.' We have noticed how Galt himself once described him. Elsewhere Galt remarked that he had heard him called 'a compound of a gentleman and a bear'; adding, 'I did not know that bears were so good-natured.' He seems to have had a soft and kindly heart towards any form of suffering which came within his ken and which his nature could appreciate. There was, doubtless, much want of imagination at bottom of the thoughtless mendacity by which he lured others into sufferings incomprehensible to himself, who could sleep anywhere, and who could eat anything, even raw pork. To his friends he was staunch and faithful. He had the true pioneer's fellowship with animals: owning a fawn which would follow him about the house and leap at his bidding, and also a trained gander; he would not part from the kittens on his hearthrug; and an inn could be recommended to him as 'a cosy place where there was plenty of dogs and tomcats.' He had a clear perception of the sort of people who should go to a new country—and choked off some misplaced philanthropy by writing plainly, 'I have no occasion for a fine young thief of twenty-two or thereabouts, and if I needed such an accommodation I have no need to import it.'

Both the doctor and the captain seem to have been humorists of the first water. They put up a doorplate on their wilderness homestead of Gairbraid, round which they vainly desired a village to grow. They had a manservant, in white jacket and with table-napkin in hand. And it was by way of the kitchen door that romance entered the Canadian part of their lives.

The doctor had had his own love-story, ending in some misunderstanding which, it is believed, started him off to Canada. Then a certain Highland dairymaid—one Louisa MacColl—was sent out from his Scotch relatives to serve him and his brother in their exile. She proved so invaluable, and they were so afraid of losing her, that, according to the doctor, he gravely proposed that one of them must marry her, and that the toss of a coin must decide to whose lot she should fall. The doctor had the manipulation of the coin, and it decreed that the captain should be the bridegroom. The lady's version was different—but scarcely contradictory; indeed almost a confirmation. She said she had received an offer of marriage from somebody else, and that the captain, coming up behind her as she was milking 'Blossom,' whispered to her, 'Lou, if you leave us we may as well shut up shop,' and proposed to her there and then. She proved a good wife, and a good friend to the pair, whom to the end she always called 'her deare gentlemen.' She liked her new dignities and indulged in costly apparel, but persisted in every form of domestic and dairy labour. She could not read, but she was in the habit of keeping a book open before her on Sabbath afternoons. She tried, perhaps out of mere thrift, to restrain the convivial habits of 'her deare gentlemen,' and took care of their snuff-bedabbled linen. She was of a persistently active, 'doing' nature; when she went for a walk with the captain he would botanise, but she would tuck up her smart skirts and set fire to stumps. After she came into authority she kept the purse and paid for everything. A neighbour said 'she was pretty near all her life at war with somebody,' and it was chiefly in the interests of 'the deare gentlemen.' She was as true to them in death as in life, taking any amount of trouble and cost that the two brothers might sleep, as they had wished, in one grave. She survived them many years, for she lived far beyond threescore and ten, while they both died in their early fifties—their magnificent constitutions probably broken up by their potations.

These drinking habits made the majority of the first settlers but dangerous friends to the native Indians, with whom, apart from this, their relations seem to have been neighbourly and honourable; though the Indians humorously remarked that 'White man was less willing to give Indian share of his beef than the Indian was to give the white man a share of his venison or other game.' Nobody was more esteemed among the early settlers than John Brandt, son of the famous chief of that name, and himself a member of the legis-

lature. He was an educated man, conversant with British literature. When he visited England he enforced on the poet Campbell a public retraction of the error in those lines of his 'Gertrude of Wyoming':

Scorning to wield the hatchet for his bribe,
'Gainst Brandt himself I went to battle forth:
Accursed Brandt! he left of all my tribe
Nor man nor child nor thing of living birth—

the young 'warrior' conclusively proving that his father had had nothing whatever to do with the circumstance referred to.

This demoralisation of the Indians was not carried on in any cynical spirit desirous of their destruction, and ready openly to declare that 'the right way to approach a savage is with brandy and guns.' It was but the inevitable result of the white men's own habits and of his ruinous conception of neighbourliness—the Highlanders being especially accused of giving freely to the Indians 'that which they appreciated highly themselves.' We are told that on a certain occasion one old warrior was seen to kneel down in his canoe, praying to the great Manitou for an abundance of meat and game, and making offering of that which, being manifestly most precious to the white man, seemed to him most likely to be acceptable to the white man's God—that is, rum and tobacco!

Out of these scenes of general drunkenness, bickerings would occasionally rise, but rarely or never seem to have culminated in bloodshed. The Indians were ready with succour when provisions ran short. The young Galts romped with young Indians. Other adventurous lads went off with them in their canoes, were royally entertained and safely restored to their homes. A little daughter of one of the most valuable settlers, a man who stood

steadily for temperance, was intrusted to two 'braves' who escorted her from town to her father's homestead. The little lady said they were very careful of her, and when she wanted a drink they made her wait till she came to a spring. Their permanent camp was not far from her home, and it was the young folks' greatest treat to go to see their dances and inspect their stores of maple-sugar, baskets, and moccassins. The squaws wrought the bead and bark knicknacks which have since grown familiar in this country as 'keepsakes from Niagara.' It may interest some to hear how they did their work. They traced their patterns upon bark with their teeth, first folding it many times with fancy angles: the corners, once bitten, when opened formed a regular design. Like the ancient Highlanders, they did not go far for their dyes: hemlock supplied red; root of the white ash, yellow; indigo, blue, or mixed with yellow for green. They could work in the dark as well as in daylight, a fact readily credible to those who have seen the fairy-like meshes which are wrought in gloomy Shetland hovels.

Anybody now taking his stand on some gentle rise in this favoured corner of Canada Felix, 'where no man need be hungry, where no child remains untaught,' and surveying the tall spires and many cupolas, the orchard-embowered homesteads, the clustered roofs, the bosky bits of town and country, may well wonder if these fruitful lands can indeed be the tangle of rotting log, swale, and noonday nights through which the first dwellers broke their way.

Dunlop once asked what it was which so increased the value of the land, and right wisely he answered his own question:

'Nothing but the work and the worth of the men who tilled it.'

JOHN BURNET OF BARNES.

CHAPTER V.—COUSINLY AFFECTION.

 **T**was near midday before I started, so that night I got no farther than the town of Hamilton, but lay at the inn there. The next morning I left betimes, thinking to reach Barnes in the afternoon. As I rode along the greensward by the side of the Clyde the larks were singing in the sky and the trout were plashing in the waters, and all the world was gay. The apple-orchards sent their blossom across the road, and my hat brushed it down in showers on my horse and myself, so that soon we rode in a mail of pink and white. I plucked a little branch and set it in my hat, and sang all the songs I knew as I cantered along. I cried good-day to every man, and flung money to the little children who shouted as I passed, so that I

believe if there had been many more boys on the road I would have reached Tweeddale a beggar. At Crossford, where the Nethan meets the Clyde, I met a man who had been to the salmon-fishing and had caught a big salmon-trout; and, as I looked, my old love for the sport awoke within me, and I longed to feel a rod in my hand. It was good to be alive, to taste the fresh air, to feel the sun and wind, and I cried, 'A plague on all close lecture-rooms and musty books.'

At Lanark I had a rare dinner at the hostel there. The gray old inn had excellent fare, as I knew of old, so I rode up to the door and demanded its best. It was blessed to see a man obey your words after for many months being a servant of others. I had a dish of well-fed trout and a piece of prime mutton, and as good claret,

I think, as I have ever tasted. Then I rode over Lanark Moor to Hyndford, and through the moor of Carmichael, and under the great shadow of Tinto Hill. Here the smell of burning heather came to my nostrils, and so dear and home-like it seemed that I could have wept for very pleasure. The whaups and snipe were making a fine to-do on the bent, and the blackfaced sheep grazed in peace. At the top of the knowe above Symington I halted, for there before my eyes were the blue hills of Tweeddale. There was Trehenna and the hills above Broughton, and Drummelzier Law and Glenstivon Dod, and, nearer, the great Caerdon; and beyond all a long, blue back, which I knew could be none other than the hill of Scrape which shadowed Dawyck and my lady.

I came to Barns at three o'clock in the afternoon, somewhat stiff from my ride, but elated with my home-coming. It was with strange feelings that I rode up the long avenue of beeches, every one of which I could have told blindfold. The cattle looked over the palings at me as if glad to see me return. Maisie cocked up her ears at the hares in the grass, and sniffed at the hill air as if she had been in a prison for many days. And when I came to the bend of the road and saw the old weatherbeaten tower my heart gave a great leap within me, for we Tweeddale men dearly love our own countryside, doubtless by reason of its exceeding beauty.

As I rode up, Tam Todd came out from the back, and seeing me, let fall the water which he was carrying and ran to my side.

'Eh, Maister John,' said he, 'I'm blithe to see ye back sae braw and genty-like. My airm's fair like timmer wi' stiffness for want o' the back-sword play, and the troots in Tweed are turned as thick as peas for want o' you to haul them oot; and twae mornin's last week there were deer keekin' in at the front door as tame as kittlins. There's muckle need o' ye at hame.'

He would have gone on in this strain for an hour had I not cut him short by asking for my father.

'Middlin', just middlin'. He misses ye sair. He'll scarce gang out-doors noo; but he'll be a' richt gin he sees ye again. Oh, and I've something mair to tell ye. That wanchaney cousin o' yours, Maister Gilbert, cam' yestreen, and he'll be bidin' till the deil kens whan. I'se warrant he's at meat wi' the auld maister the noo, for he cam' in frae the hills geyan hungry.'

Now at this intelligence I was not over-pleased. My cousin was a great man and a gentleman, but never at any time over friendly to me; and I knew that to my father he was like salt in the mouth. I blamed the ill-luck which had sent him to Barns on the very day of my home-coming. I needs must be on my dignity in his company, for he was quick to find matter for laughter; and it was hard that he should come at the time when I longed so eagerly for the free ways of the

house. However, there was no help for it, I reflected, and went in.

In the passage I met Jean Morran, my old nurse, who had heard the sound of voices and come out to see who the new-comer might be.

'Maister John, Maister John, and is't yourself? It's a glad day for the house o' Barns when you come back;' and when I gave her the shawl-pin I had brought her from Glasgow she had scarce any words to thank me with. So, knowing that my father would be in the dining-hall with his guest, I opened the door and walked in unbidden.

My father sat at the head of the long, oak table, which had been scoured to a light brown and shone like polished stone. Claret, his favourite drink, was in a tankard by his elbow, and many wines decked the board. Lower down sat my cousin, gallantly dressed in the fashion of the times, with a coat of fine Spanish leather, and small-clothes of some rich, dark stuff. His plumed hat and riding-cloak of purple velvet lay on the settle at his side. His hair fell over his collar and shoulders, and well set off his strong, brown face. He sat, after the fashion of a soldier, on the side of his chair, half-turned away from the table, and every now and then he would cast a piece of meat to Pierce, my old hound, who lay stretched by the fireplace.

My father turned round as I entered, and when he saw me his face glowed with pleasure. Had we been alone we should have met otherwise; but it is not meet to show one's feelings before a stranger, even though that stranger be one of our own family. He contented himself with looking eagerly upon me and bidding me welcome in a shaking voice. I marked with grief that his eye did not seem so keen and brave as before, and that he was scarce able to rise from his chair. My cousin half-arose and made me a grand bow in his courtly fashion.

'Welcome, my dear cousin,' said he. 'I am glad to see that your studies have had little effect on your face.' (I was flushed with hard riding.) 'You look as if you had just come from a campaign. But fall to. Here are prime fish, which I can commend; and venison, also good, though I have had better. Here, too, is wine, and I drink to your success, my learned cousin;' and he filled his glass and drank it at a gulp. He spoke in a half-bantering tone, though his words were kindly. I answered him briskly.

'I had little thought to find you here, Gilbert, but I am right glad to see you. You are prospering mightily, I hear, and will soon be forgetting your poor cousin of Barns;' and after a few more words I set myself to give my father a history of my doings at Glasgow College. Again, had we been alone, I should have told him my causes for leaving and my wishes for my after-life; but since my cousin was present, who had ever a sharp tongue, I judged it better to say nothing.

(To be continued.)

WATER: THE MODERN RIVAL OF COAL.

By J. B. C. KERSHAW.



ITHERTO man, when he has wished to produce energy in large quantities for the various requirements of his industries, has known but one source from which to obtain it—namely, coal. Coal, as every one knows, represents the locked-up energy of the sunshine of former days. Man had been upon this earth many thousands of years before he discovered the value of this black, hard substance as a source of heat; and it was only within the present century that he learned how to most effectually tap these latent stores of force, and how to obtain not only heat, but mechanical or electrical energy, at will from the coal-beds of the earth.

The industrial developments of the present century are largely if not chiefly due to the improvements of the steam-engine and to the power thus put into man's hand of developing large amounts of mechanical energy from coal.

So important has this use of coal become that the question of what is to happen to our industries when our coal-beds are exhausted has for long been a subject of serious speculative thought. It may therefore be of interest to our readers to learn that man has during the last ten years learned how to tap and utilise at will an almost limitless store of energy, a store that, unlike the locked-up sunshine of coal, can never be exhausted so long as rain falls upon the hills or snow upon the mountains of the earth. Man has in fact advanced one step farther in his command of the forces of the earth. He has learned how to harness the rivers and streams to the car of industry, and how to extract from water the service that he has hitherto obtained from coal. It is in this aspect, as a source of power, that water will be the future substitute for coal, and that it has already, in certain industries, become its rival.

The power of falling water has of course been known to man for many centuries; and since water-wheels are some of the oldest of mechanical contrivances for producing power it may be urged that this new step forward is in reality a step backwards along the path trodden by our forefathers. But the progress made by the men of an earlier day along this path was soon barred by their inability to construct water-wheels suited to any but the most moderate powers; and during the second and third quarters of the present century there was no advance made in this method of generating force for use in the industries of our country. As these extended and passed from the local stage of their existence to that of supplying not only the whole country, but all the countries of the world, with their products, the amount of mechanical energy required to drive the machinery of even a single mill or workshop rose from 50 up to 500 or 1000

horse-power; and the steam-engine was found to be far more convenient for producing these large amounts of mechanical force than the water-wheel and mill-stream of former days.

Why then is it that after a half-century of progress in the use of steam-power, during which steam-engines have undergone great improvements in efficiency, a return should now be not only thought of, but actually in progress, towards the methods of generating power that were in use at the commencement of the century?

The explanation lies in the fact that the engineers of the present time have at their command two machines which were unknown to, or little understood by, their predecessors. The first of these, the 'turbine,' was invented about 1801, but did not come into actual use on an extensive scale until late in the century; the second, the 'dynamo,' is an invention of the middle years of the century, and has received its greatest improvements during the last fifteen years. The former machine has enabled the modern hydraulic engineer to make use of any waterfall, however high, for the generation of power; and the latter has made it possible to transport the energy developed by the turbine to distances up to thirty-five miles, where it may be delivered to the factory or mill as simply and conveniently as water is delivered by pipes from a distant reservoir in the hills.

It is thus seen that it is chiefly due to the progress of electrical science that this new step forward in the utilisation of water-power has been made possible; and the development of the modern methods for tapping the almost limitless water-powers of the earth is therefore another triumph for the electrical engineer.

The turbine—the mechanical contrivance by which the energy of falling water is converted into mechanical energy—may be either a 'reaction turbine' or an 'impact turbine.'

The former is the more usual type, and is represented fairly adequately by the paper wheels mounted upon sticks which seem to have displaced toy balloons in the fancy of the rising generation.

These toys are really 'air-turbines'; and the turbines by means of which great water-powers are now being utilised differ from these only in their size and material of construction. In place of a gentle current of air, one has a fierce and mad rush of water with which to deal; and paper is therefore replaced by thick castings of steel or bronze. The principle is however the same in both; for in the one case a gentle current of air, in the other case a wild rush of water, is the immediate cause of the revolution of the specially-designed wheel or turbine.

The turbines are always placed at the bottom of large and massively-constructed masonry chambers,

called 'wheel-pits.' The water is conducted to the turbines by enormously strong pipes known as the 'penstocks.' These pipes are generally vertical, and the strength at the turbine-end has to be much increased, to enable them to withstand the enormous pressure created by the weight of water which they contain. The water is carried away from the wheel-pits by 'tail-races.' These are open channels when the ground formation permits of this; but in some cases underground drains have to be made.

There are a very large number of water-power stations now in operation in Switzerland, Italy, France, Norway, and the United States, in which the 'reaction turbines' are being used to utilise heads, or volumes, of water that could not have been dealt with adequately by the older form of over- or under-shot water-wheel. Of these the most important are undoubtedly the two power-stations at Niagara; and some details of these may not be out of place here. The 'wheel-pit' of the 'Niagara Falls Power Co.' at Niagara is an enormous hole in the ground situated one-third of a mile from the upper river. The water is carried to the mouth of the wheel-pit by an artificial canal 250 feet wide by 12 feet deep. The 'wheel-pit' is 140 feet long by 18 feet wide by 178 feet deep, and is entirely cased with masonry. The vertical 'penstocks' which carry the water from the canal to the turbines at the bottom of the wheel-pit are constructed of steel-plates riveted together, and are 140 feet in height by $7\frac{1}{2}$ feet in diameter. The total pressure at the bottom of these pipes when they are filled with water is estimated to be between 40 and 50 tons. The turbines are massively-constructed wheels of bronze 5 feet in diameter; each wheel produces 5000 horse-power energy, or an amount equal to that produced by ten of the best and strongest locomotive engines ever built.

The wheel-pit at Niagara just described is planned to hold ten of these turbines; so that when all are in position 50,000 horse-power will be produced at this one power-station. The 'tail-race' by which the water from these ten turbines is to be carried away has been constructed through the solid rock, and is a tunnel $1\frac{1}{2}$ miles in length, which opens on the lower reach of the Niagara River. This tunnel is 19 feet in width and 21 feet in height, and is therefore nearly equal in size to many railway tunnels. It is certainly a very noteworthy 'drain'; probably the largest in the world.

Turning now to the other form of turbine, the 'impact-turbine' or 'Pelton wheel,' we find that this is principally used in the mining districts of the United States, where very great heads of water have to be dealt with. It is also being used with steam-power; and the torpedo-catcher *Turbinia* which excited great attention, on account of its unequalled speed, at the recent Naval Review, was driven by one of these 'impact-

turbines.' Let the reader imagine a wheel constructed of twelve tea-spoons, with all their handles fixed radially around a common centre, all the bowls facing in one direction, and the whole firmly held together by a mass of metal extending half-way to the circumference. It is evident that if this be fixed at its centre so that it can revolve, and a jet of water or steam be allowed to play into one of the bowls at its circumference, revolution of the wheel will occur. An 'impact-turbine' is such a wheel, much magnified. The most notable of this class of turbines in existence are those used at Fresno in California, for developing 1000 horse-power from a 1400 feet head of water! The wheels used here are 5 feet in diameter, and the water used to drive them issues from a $1\frac{1}{2}$ -in. nozzle with a velocity of 1000 feet per minute. This jet of water near the nozzle acts like a solid, and offers as great a resistance to any attempts to deflect it as a steel-bar of the same diameter. If this jet of water were directed against a man at any distance within 100 feet it would most certainly kill him by the mere force of its impact.

Having described the two forms of turbine by which the energy of moving water is converted into the mechanical energy of a rotating wheel, it is necessary now to describe the modern method for transporting this energy from the bottom of a penstock at Niagara, or from some inaccessible valley in California, to a locality or district more suited to the successful conduct of industrial operations. It is here that the dynamo comes to the aid of the hydraulic engineer.

A dynamo fixed on the shaft that is carrying one of these turbines of course revolves with it; and, as it revolves, currents of electricity are produced in the coils of wire of which it is largely composed. No explanation can be given here of the principles upon which the method of conversion of mechanical into electrical energy by the dynamo is based. It must suffice for the reader to know that it can be effected; and that ninety-five per cent. of the energy represented by the whirling wheel of the turbine can be obtained by means of the dynamo as electrical energy. This electrical energy may now be transmitted by 'air lines,' which are only telegraph wires on a much larger scale than that usually seen, as regards thickness of wire and strength of supports, to the factory or mill where it is to be used. If the locality where the water-power is situated is convenient and suitable for industrial operations this may be only a few hundred yards from the wheel-pit and power-house containing the dynamos; but in many cases this air-line extends to miles, and the transmission of electrical energy equal to many thousands of horse-power to distances of from five up to thirty-five miles is now an accomplished fact. There is a certain loss incurred in this transmission of energy, which increases with the distance; and it is still most economical to utilise the energy near the point where it is generated. Nevertheless energy

transmitted distances of from eighteen to twenty-five miles is being used in Rome, in Milan, and in Salt Lake City, because it costs less in these cities than energy generated by steam-power.

This is an enormous gain to industry; for the utilisation of the power can thus occur within a very wide radius of the spot where it is generated; and in selecting the site for a mill or factory it is possible to take into consideration the question of proximity to the markets for the raw or finished materials of the manufacture.

The uses for which the electrical energy developed from water-power is being employed are exceedingly diverse, and illustrate well the remarkable adaptability of this form of energy.

In many cases it is used for lighting purposes. Geneva, Rome, and Milan in Europe are lighted by electricity generated in this way; while in the United States, Salt Lake City, Concord, Portland, St Paul, and Minneapolis are the most important examples of cities already lighted, or shortly to be lighted, by electricity derived from near or distant falls of water. Many examples of this method of utilisation on a smaller scale are to be met with in the mining-towns of the Western States of America; and in Europe small lighting installations of a similar kind exist in many of the smaller towns and villages of Switzerland. The electricity may also be used to work tramway systems, and examples of this application of water-power are now to be seen at Buffalo and Salt Lake City, and at Montreux in Switzerland. Lyons will shortly have a similar system at work, with energy derived from the Rhone some miles above the city.

The electricity generated by means of water-power may also be used for carrying out electro-chemical or electro-metallurgical operations on an industrial scale, and this is the use to which the greater proportion is now being applied. Aluminium is produced by two works at Niagara, two works in France, one in Switzerland, and one in Scotland, the aggregate horse-power consumed by these six works being at present about 15,000.

Chlorate of potash, the manufacture of which was until recently almost wholly in the hands of the South Lancashire chemical manufacturers, is now made by an electro-chemical process at one factory in Switzerland, one in Sweden, one in France, and one in the United States. Those who are qualified to judge believe that in another ten years the electro-chemical method will have quite supplanted the older chemical method of manufacture.

Calcium carbide and silicon carbide are two other compounds which are being manufactured on a fairly large scale by means of electricity derived from water-power. In the case of these the electrical energy is converted into heat in the electric furnace; and the manufacture is impossible in any ordinary furnace, because the

heat required to produce these compounds is so intense. In Canada, in Norway, and in Austria wood-pulp for use in paper-mills is being produced by the aid of electricity derived from water-power. In this manufacture the electrical energy is used both for driving the machinery by which the wood is reduced to pulp, and also for bleaching the pulp in the final stages of production. The former demands mechanical energy, the latter chemical energy; electricity supplies both with the minimum of trouble, dirt, or expense.

The use of electricity for driving machinery has up to the present not extended much beyond an experimental stage in Europe; but in many of the mining-districts of the Western States of America the machinery is being driven in this way by electricity generated from centrally situated water-power stations; and there is no doubt that in course of time the machinery in use for many of the smaller industries in the cities of Europe will be operated by means of electric motors and electrical energy from some distant water-power stations. Geneva and Lyons are the two cities at present taking the lead in this application of water-power.

The two schemes now being worked out on a practical basis at Niagara provide for the development of 100,000 horse-power. The machinery of many of our largest mills and factories does not require more than 500 horse-power to drive it. A busy manufacturing district will therefore, in course of time, be formed round Niagara. Since these works and factories will in but few cases require to burn any coal, one of the objectionable features of a manufacturing district of the present date—the heavy cloud of black smoke and sulphurous vapour—will be conspicuous by its absence. This is a gain only to be truly appreciated by those who have lived in a Manchester or Sheffield for long years of their life. But big as the Niagara scheme is, work has just commenced upon a still larger scheme of water-power development near Massena, on the St Lawrence River, U.S.A. It is intended to develop here 150,000 horse-power, by taking advantage of the difference

the power, by taking advantage of the difference in level, between the St Lawrence River and the Grass River, flowing nearly parallel to it at a distance of $3\frac{1}{2}$ miles. A big canal is to be cut across the intervening plateau, and a fall of water fifty feet in height thus obtained on the bank of the Grass River. The latter river will itself form the 'tail-race' of the power station. This scheme dwarfs the Niagara one, since not only do the plans provide for a greater amount of power, but man is going to do what nature has done for him at Niagara—namely, provide the waterfall. The necessary capital for carrying out this scheme has been provided, work has been commenced, and it is hoped that some of the turbines and dynamos will be working by December 1898. If no unforeseen difficulties occur, and if this scheme be completed by the date named, it will certainly form

one of the most remarkable achievements of the century.

The significance of these facts relative to the utilisation of water-power for industrial purposes is chiefly an economic one. Water-power is in nearly every case cheaper than steam-power; and when the natural formation of the fall favours its exploitation for industrial purposes, water-power is greatly the cheaper of the two. Even at Niagara, where the initial cost has been extremely heavy, the electrical energy is being sold at a lower rate than it would cost to generate it on the spot, even with the best of modern steam-engines and cheap fuel. Now it is a curious fact that in Europe those countries rich in the possession of extensive coal-beds—namely, England, Germany, and Belgium—

are extremely poor in their possession of natural water-powers; whilst Switzerland, France, Norway, and Sweden—countries which have hitherto been of little importance in the industrial struggle on account of their lack of coal—have been highly favoured by nature in the number and magnitude of their water-powers.

This brief review of the principal applications of electrical energy derived from falling water shows that the modern methods for the utilisation of water-power have passed beyond their experimental stage; and that, great as the advance during the past six years has been, it may reasonably be expected to be surpassed by the developments that will occur during the remaining years of the century.

THE GURNARD ROCK.

CHAPTER V.



N the summer evening Captain Johns paced the pier at St Budoc, and frequently swept the sea with his binoculars.

'Any sign o' they valiant fighters?' asked Caleb Hocken the sailmaker.

'Nought in sight yet,' said the captain.

'Folks be takin' a brave notice o' this yer shindy; looks'ee to 'em—there's swarms on the pier; 'tis jest like a regatta-day.'

'Well, 'tisn't an ordinary common sort o' fight; 'tis most unusual, an' in a manner o' spaking 'tis unique!' The captain gave pompous emphasis to this last word, and his audience vaguely felt the appropriateness of the adjective.

'They ought to ha' been back hours ago,' he continued somewhat anxiously, 'for the tide's running out. 'Tis a hugly business from the start, an' us ought to ha' prevented it.'

The sun went down behind Trevasse Point, and the great headland loomed in purple shadow against the western sky. A long gleam of light lay upon the water to the south of the point, and in that streak of radiance was a black dot. For some minutes the captain kept his glass upon the dot, and he looked puzzled.

'Tis surely the boat; but 'tis beyond me why they don't put up a sail, for the wind's made for 'em—an' they two fules went to the battle without vittles.'

'Can 'ee spy the boat?' cried a chorus of eager voices.

'Iss—but I can't spy the men.' Then, after a prolonged scrutiny, he exclaimed, 'Bless my sawl an' body! the boat's drifting!'

'Then where be the chaps?' cried Jacob Trewarne.

'In the bottom o' the boat, I reckon,' suggested Nick Maddern; 'both of 'em dead-beat.'

'Get a boat out!' roared Captain Johns; 'quick, boys! Better take the *Thyrza*; her's fastest.' And as the young men hurried down to the beach he muttered, 'That durned launch o' Lloyds'd be useful, but the fire's out, an' emergencies don't give 'ee wan houf's notice.'

Within five minutes half-a-dozen tawny-sailed fishing craft were bearing towards the drifting boat, the swift *Thyrza* easily leading, the others following more from excited curiosity than any hope of assisting.

'Cap'n Jan, will 'ee let me peep through your glass?' said a low, wistful voice at the captain's elbow; and there stood Miriam Roskree, pale and troubled. Her fingers trembled as she took the binoculars, and she looked long in the direction of the boats.

'Wan o' your sweethearts, isn't 'a?' asked the old man drily.

'Iss, I believe he's my sweetheart,' she answered simply.

The girl came of a turbulent race; her family counted its generations of old-time smugglers; her own father, Richard Roskree, was seriously concerned in a fishing riot, and only evaded the assizes by a prolonged voyage abroad. Hereditary law-breaking and violence may have influenced her character. She was passionate, and there was in her nature that Celtic clannish instinct that cleaves to its own, right or wrong. She was as proud of her birthplace, this little picturesque, evil-smelling Cornish fishing town, as if she were lady paramount of its blue waters and narrow streets. She was jealous of the honour of St Budoc. Once, when the lifeboat crew were gravely considering the possibility of a rescue in a sea that was white with fury, a girl's voice interrupted their deliberations: 'Be 'ee waiting for Porthillian?' And it was the taunt that launched the boat.

The tearing of the net by the Porthillian fishermen had stirred her like a personal wrong ; and like a personal shame she felt the seeming pusillanimity of St Budoc in inadequately resenting the outrage. Yet she now bitterly repented her wild words that had instigated the outbreak of Gabriel Lowry. The attack on the Porthillian man was nothing but rude, unreasonable violence, and its sequel at the best but a vulgar fight—and she had provoked it.

Miriam had many wooers, for her beauty was uncommon. Gabriel had been a strange suitor ; he was devoid of compliments, and had none of the flattering pleasantries that are dear to a girl's heart. There was an uncouth, jealous earnestness in his wooing that was not always acceptable. Miriam had never realised how much she loved the man till now—now, when her eyes were fixed on the darkening waters which bore that drifting boat betokening catastrophe.

It was quite dark when the little flotilla returned, the *Thyrza* with the captured boat astern. When they were within hail there was a chorus of shouting : 'What luck ? Any sign o' the men ?'

And the answer came : 'No sign !'

The *Thyrza* was run into the sandy beach, and a dozen men waded in to drag the empty boat ashore.

'Anything in the boat ?' asked Captain Johns.

'Nought but the oars and two great stones,' cried Jacob Trewarne.

'Two great stones !' the words were taken up with a shriek in the voice of old Malachi Praze. 'Tis a merracle ! 'tis a judgment ! Two men went forth in their pride and wickedness, an' what cometh back ? Two stones ! 'Tis verily the Lord's doing !'

The frenzied old man spoke with such appalling earnestness that for the moment his wild words carried conviction to the more credulous of his hearers, and the group of men and women shrank back from the boat they were peering and groping into.

'Two dead stones ! 'Tis a sign o' judgment ; 'tis a terrible warning !' continued Malachi, standing by the boat bareheaded, and looking like a dishevelled prophet in the shifting lantern-light ; but his rhapsody was interrupted by the cynical Nick Maddern with the blunt query, 'How about the pair o' boots ?'

'They 'n my poor son's boots !' cried Mrs Lowry, a tall, stout woman, stepping forward and clutching them eagerly. Then, as she moved away sobbing, she caught sight of Miriam Roskree ; and standing before the girl, pathetic but somewhat ludicrous—for she held a huge boot in either hand (the boots being indeed Tregenna's)—she asked, 'Where's my son ?'

And Miriam, proud as she was, cowered before the grief of the mother's face and voice.

That was a bitter night for Miriam Roskree. Five boats set out towards the Gurnard, in a hopeless quest for the missing men, and the girl vainly

begged to go in one of the boats. She returned to her home on the hill-slope ; she patiently carried the supper to her querulous bed-ridden aunt ; and sitting in darkness in the little parlour, she looked through the window out upon the water for the lights of the returning boats. The cloth was still upon the table that she had laid hours ago, and all her dainty preparations for the tea to which Gabriel Lowry was to have been invited. There were roses in a vase, and in the oven there was a neglected squab-pie, as cindery now as her own hopes ; and the scent of the roses mingled with the burnt odour of the forgotten pie. So the long hours passed—the retributive hours, that chastened the soul of Miriam Roskree, and taught her the lesson of years in the space of one tragic night.

In the early morning, when many were astir to ask the one question that came first to the lip of every waking soul in St Budoc, Gabriel Lowry came into the town by the north road from Pen-goosey, in the horse-doctor's trap, whole and hearty, but ridiculous enough in borrowed garments all too brief for his long limbs.

Mrs Lowry was hysterically overjoyed when Gabriel opened her door ; and the news of his return flashed through the town like magic. Mrs Lowry's kitchen was filled with inquirers, and those that could not get into the house made a semicircle around the door, and stared at Gabriel eating his breakfast, flinging a hundred questions at him.

'How about the fight ?' asked Nick Maddern from the road.

'John Tregenna o' Porthillian is the best man,' answered Lowry ; 'he's the best man by a brave sight.' But when pressed for details he became incommunicative, and his interrogators prudently forbore.

When Lowry went down to the beach to claim Tregenna's boat, Miriam Roskree, glad beyond words, stood at her door and waited his passing ; but Gabriel strode straight on, as though he saw her not. She had sent him to fight, and there had been no fight ; therefore he had no greeting for her. But Mrs Lowry saw the spasm of pain that swept across the girl's face, and, turning to her son, said, 'Gabe, I think you'd better turn back and speake to the maid.' And Gabriel Lowry turned back and spoke.

Next Sunday morning a strange scene of penance was enacted outside the Methodist chapel. It weighed upon the simple soul of Gabriel Lowry that there had been no requital for the blow he had given John Tregenna. He would have accepted defeat in the fight as a natural and proper quittance ; but the blow remained a thing unexpiated. Wherefore he consulted Polreggan, who devised a solemn act of contrition.

There was a full meeting, for a rumour was abroad that Gabriel Lowry had mended his ways and was going to testify. When the congregation

issued after the service Lowry was standing at the top of the steps, and he cried, 'Mr Polreggan, I call'ee to witness!' Polreggan came solemnly forward. 'Last Sunday morning, at this chapel-door, I struck John Tregenna o' Porthillian, with no good cause or reason, for which devilry I'm as sorry as a man can be that hath wronged another.' So far Gabriel had kept fairly to the prearranged formula of contrition, and Polreggan nodded benign approval; but the remainder of his speech was a departure from the programme, and the worthy old man had grave doubts of the seemliness of the whole matter. 'An' if any man hath aught 'gainst John Tregenna, anything o' ripping nets, or foul fishing, or lies o' that sort, I'm ready to testify for John Tregenna in my own way, man to man, anywhere, any day 'cept Sunday!'

In the following January, when the beneficent

south wind blew a phenomenal spring day into the heart of the winter, Gabriel Lowry married Miriam Roskree. Some folks shook their heads, as folks will; and old Mrs Chegwith said, 'Aw, well! they'm well mated—vire an' brimstone.'

And blithest of the guests was John Tregenna of Porthillian, all in his Sunday best, and looking, as was observed, 'as brave as a duke'—which may be taken as a high compliment to ducal comeliness. He did not come empty-handed, but brought tribute in a handkerchief, which, being proudly unknotted and removed, disclosed a shapely vase of polished serpentine, superb in colour—dark green, with blotches of black and veins of gray and white and red.

While the company encircled the table admiring the gift, Tregenna turned to Lowry, and said, 'My son Jan carved 'en out o' wan o' they stones us picked up on the Gurnard.'

THE SALONES OF THE MERGUI ARCHIPELAGO.

FOR the facts in the following article (which have been supplemented by a government paper) Mr T. C. Loveridge, engaged in the pearl-fishing in the Mergui Archipelago, Burma, is mainly responsible. He describes a curious and little-known people, the Salones, of whom there seems to be between one and two thousand, living in jungles and boats mainly, in the Mergui Islands. They are very low in the social scale; and, as if they were not already low enough, we find a superior, or at least a stronger and more cunning, people coming in and depriving them of the fruits of their industry. Strong drink and opium are the baits. Mr Loveridge says in his letter accompanying his communication, that it 'puts shame into my own face as I think how completely the Chinese and Malays, the Chinese especially, have carried on a game to enrich themselves at the hands of these poor individuals, robbing the government at the same time.' The suggestion towards writing the article (which was done while waiting on his fishing-nets) came in this way. A brother fisherman had died of typhoid fever, and left him heir to some odd numbers of *Chambers's Journal*. These he perused in his boat, when the idea occurred to him of letting the outside world know through its pages something about his surroundings, and the hopeless degradation into which the Salones seem to have fallen.

The Mergui Archipelago forms part of the lower or Tenasserim division of Burma, which since 1826, by the treaty of the King of Ava with the British East India Company, has been under our government. The archipelago has been described as 'a cluster of islands and islets, with

bays and coves, headlands and highlands, capes and promontories, high bluffs and low shores, rocks and sands, fountains, streams, and cascades, mountain, plain, and precipice, unsurpassed for their wild and picturesque beauty.' The caoutchouc tree abounds, and the wild animals include the tiger, rhinoceros, and deer. The Salones dive for mother-of-pearl shells, spear fish, hunt the wild pig with their dogs, and eat yams, rice (which they get by barter), and a wild potato. They move from place to place; do not even cultivate a handful of rice, and although a stray missionary was amongst them in 1838, and again in 1846, every attempt to improve them seems to have been in vain. One visitor has said: 'The regeneration of this race will probably never be effected; but the Salones open a fine field to a truly philanthropic missionary.' Their boats of about twenty feet long are their homes; to his boat the islander 'entrusts his life and property; in it he wanders during his lifetime from island to island; a true ichthyophagist, for whom the earth has no charm—the earth-mother whom he neglects so much that he does not entrust to her a single grain of rice.' The children have a bad time of it; and, probably from their eating indigestible food, the mortality amongst them is great up till six years of age. The Salones know of no medicine; the mortally sick are often left to nature, and they depend for recovery on a kind of 'devil dance' round the sufferer, who is meanwhile dosed with drink, for the bad spirit within him is a thirsty devil, and needs copious supplies. The spirit is drawn out through the arm of the patient.

When a white man or a stranger appears, their first impulse is to decamp and hide in the jungle. At least the women and children invariably do so; while the food, such as sea-

slugs and rice, is hastily buried. Dr Heifer, after a visit in 1857, thus describes a group of these people: 'There were about seventy men, women, and children altogether. They had encamped on the sandy sea-beach; each family had erected a little raised shed covered with palm-leaves, where all the members huddled together for the night. There they sat, a dirty, miserable-looking congregation, the women occupied in making mats of a peculiar description from seaweed; the children screaming, apparently out of fear at the strange apparition; dogs, cats, and cocks all joining to make the full chorus. . . . Some of these sheds appeared like butchers' stalls. Large pieces of turtle, rendering the atmosphere pestilential, were everywhere drying in the sun; it is their main food. . . . On the beach lay twenty or thirty boats, well built and light, like nut-shells swimming on the surface, the bottom built of a solid trunk, the sides consisting of the slender trunks of the palm strongly united and caulked with palm hemp.'

In what follows we avail ourselves mainly of the notes by Mr Loveridge:

Since 1892 I have been constantly living amongst these people. One day, when I left the pearl-ground to lay the boat up to clean, I found myself among a number of other boats high and dry on the sandy beach, and small huts were visible in the flat jungle of Tenasserim Island. Although only a brief time elapsed between my rounding the corner of the bay and landing amongst them, more than half of the natives had already decamped. The only female left was an old woman nursing an old man. On putting a few questions to him I found that they had no method of worship, although there was slight evidence that some missionary had seen and talked to them. Their general answer is, 'We are a poor people who know nothing.' Gradually heads emerged from the jungle, and I was soon surrounded by inquisitive faces watching the effect of a dose of quinine administered to the old man.

My visit was successful as far as making friends was concerned, which was all the more remarkable as usually it was as much as their lives were worth to be visited by a mixed crew such as I had in my own boat. They gave me as many fish as were found sufficient for three meals, and returned to their camp. Next morning they surrounded my boat and asked that I should give the old man some more medicine. I met him coming off to me, looking much better. He had a family with him in his boat—sons, daughters, and sons-in-law—and several dogs. I gave a diving exhibition; and the sight of my men in the water, with heavy leads, boots, helmet, and dress, brought out the women even from the camp. The young women are little and handsome apparently up till twenty-five, when they age rapidly. At the least fright on their part they would jump overboard, swim ashore, and hide

in the jungle. After the diving exhibition we all went ashore and became friends; but of the women folks only those who were mothers were to be seen. It was explained that the young women were away making mats in the jungle. I was introduced to a company making mats. The men gather a kind of pine-apple plant, which they split into ends from one to one and a half yard long and a quarter of an inch wide. These are dried in the sun, and the colour becomes a light pea-green. The lengths are then flattened out by being pressed between boards. When sufficiently flattened they cut them all at even lengths and begin plaiting, their fingers moving as quickly as women's fingers at home in knitting. The mats are in size from three feet by six and upwards. In barter they get about two ounces of rice for a mat three feet by six. Mats are their money; sixty purchase a boat and four a fishing-spear.

There are no means of knowing whence this strange people came. My own opinion is that they are a mixture of Malays and Siamese. They do not tattoo, like the Burmans, and their features are nearer the Malay than the Burmese; and their language has nothing of Malay about it.

In personal appearance these people are a fine and well-built race, strong in limb, and with fairly good features. The men are muscular and capable of hard work even in the full heat of the sun. They appear to live to a good old age; and the population seems on the increase. The young people are growing up as their fathers have done, without any training, education, or Christian influence.

Their marriage ceremony is simple enough. In presence of the elders a piece of white cloth is presented to the bride by the intended bridegroom, and the couple are man and wife. If he does not own a boat they go to that of the parents of the bride.

Although the waters of this archipelago abound, and have abounded, with mother-of-pearl shells, green-snail shells, bêche-de-mer, and other marine produce, but little effort has been made under British control to ascertain the quantities found by the natives or the value of the beds if properly developed. The flat or mother-of-pearl shells are the largest and heaviest to be found in the London market, and are much sought after by Sheffield cutlers for knife-handles.

The dress of the Salones is certainly Malay, and is mainly a savong or loin-cloth. Vice, other than brutal intoxication, is actually unknown to them; and stealing, were they given to it, would mean stealing from their own flesh and blood. They are perfectly simple and harmless in every way. When any of their number dies, they take the remains, tie a lot of split bamboos together, and roll him up in that; and, generally speaking, make two triangles with sticks fastened together, driving the one end into the ground and placing the corpse on the top. They then put a grass

or leaf covering over the place. The knife, spear, box (if he has one), cloth, and all his earthly possessions are placed underneath the corpse. On leaving, a stick is always tied to a tree, with a small piece of white rag, showing to all that some one has been laid to rest there.

These people are able to dive in waters up to eleven fathoms, and at that depth they will swim along the bottom some yards until they secure a shell. When the shell or shells are secured they come up hands above head with the shells in them, get into the boat, and after a rest of two or three minutes repeat the operation. The men, women, and children all dive; the women in some cases turn out better divers than the men. I remember five years ago of a woman diving in ten fathoms of water between two islands where the tide runs very strong. About 10 A.M. she made another descent; and as she did not come up again, a number of the natives dived down at once to see the cause, but could not see anything of her. They reported that a shark must have carried her off; but my opinion is that a strong tide had borne her away. Nothing will tempt them to dive again in a place where a death like this has occurred. The children dive even better than their parents. Diving is only resorted to for the mother-of-pearl shell. This diving for shells is different from that practised at Ceylon. The green-snail shell is easily found; the snails weigh from half a pound to two pounds in weight, and are poked out of their holes with a small bamboo. Béche-de-mer is always collected at low-water. The value of the mother-of-pearl shell is about £120 per ton, and it takes about 550 cleaned to make a ton. Béche-de-mer and pearl-shell have been in much demand in China, as also the fish, which has sold as high as sixty dollars per pound. The need of protection is evident, for the islanders are little the better of their good fortune, Chinese and Malay pirates plundering them without mercy. The usual method of these Chinese pirates was to drug the fishermen with spirits or opium and then plunder them of all they had, threatening that the victims' wives and children would be taken away unless they remained quiet and gave

up everything. Besides opium, a liquor made from rice and the cocoa-nut palm, both strong intoxicants, has also been introduced, much to the hurt of the natives. For sixty-five years, or down to 1891, these rascally pirates have been able to hoodwink the authorities as to the value of the produce gathered from the wretched natives.

My first knowledge of the state of affairs was obtained once, when, emerging from the jungle, I saw a number of Chinese busy chopping wood and keeping a big fire going, while others were engaged in looking after some huge iron pans that were boiling over the fires. They were busy making toddy, which was in course of fermentation at the time. Many of the natives were already lying helpless on the beach, quite intoxicated, having actually taken the liquor hot from the pans.

Mergui is the centre of a very large fishing industry, and has a regular weekly mail service by steamers of the British East India Company. Chinese steamers have been calling for the past twenty years. An engineer, noticing the constant shipments of bags of shells to Penang as cargo, watched, and saw that a brisk trade was being done in them for London. This engineer embarked in the business himself, landing on Pawey Island, the most productive of the whole group. Afterwards he applied to the authorities at Maulmein for permission to fish for mother-of-pearl shells for one year, and had a small vessel fitted out from Singapore, with suitable diving apparatus. The district commissioner, however, who seems to have been overlooked in the first application for permission, caused trouble. Eventually the matter was arranged by the fishing rights in the district being put up for auction.

This was the means of opening the eyes of the government to the tons of produce which had been previously filched from the natives. Within a brief period of five years about one thousand tons of mother-of-pearl shells have been shipped to London, and about 300,000 green-snail shells annually.

It is to be hoped that something may speedily be done to ameliorate the condition of these interesting people.

E. J. Bonawain

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THE MONTH: SCIENCE AND ARTS.

PICTURES FOR POSTERITY.

THE National Photographic Record Association has recently been formed, under the presidency of Sir Benjamin Stone, to carry out a most useful and unselfish work. The main idea is to collect photographs of everything of national interest, and to deposit them in the British Museum, so that the future

historian will have a copious pictorial library for purposes of reference. With this view the association has issued an appeal to those interested in the subject to assist in the work, which they can do by becoming members, by contributing photographs, or by acting as local agents or collectors. The large army of amateur photographers must now form a complete network over the country; and they, as well as professional workers, are asked to contribute anything of interest which may

come under their notice. The pictures should be of a certain size, and must be printed by one of the permanent processes. Such particulars are set forth in the bylaws, a copy of which can be obtained from Mr George Seamell, the hon. sec., at 12 Hanover Square, London.

A PORTABLE SEARCHLIGHT.

At the last French army manœuvres a new form of portable searchlight was submitted to experimental trial, the object of the invention being to afford a means of discovering wounded men on the battlefield after dark. The lamp can be fixed on a stand or carried by a soldier, and will throw a beam of light in any direction required of such intensity that an object can be plainly seen on the darkest night at a distance of 250 yards. The French military authorities have not published any particulars regarding the lamp, but it appears to be a high-pressure jet, by which oil is ignited in the form of spray—a modification of the powerful lamps constantly used on constructive works in our own country.

JAPANESE MUSHROOMS.

Among the industries of Japan one of the most important is that of mushroom culture; but it differs so much from our own methods of growing this esteemed fungus that a brief account of the system may be of interest. The principal species of edible mushroom cultivated is known as the *shittake*, and probably the peculiar system employed would answer with no other kind. Oak-trees from twenty-five to thirty-three years old are felled in the autumn, and scored with incisions by an axe at intervals of from three to four inches. The trees are subsequently cut into short lengths, and left in secluded parts of the forest. After a period of three years mushrooms begin to make their appearance in the incisions, and they afford a yield all the year round, but the autumn crop is the most valuable. In 1895, the last year for which returns are available, the export of mushrooms from Japan totalled up to nearly two million pounds' weight. An account of the culture has recently been made public by Mr R. P. Porter, who has been studying the industries of Japan.

THE TELESCRIPTOR.

A new telegraphic instrument is favourably reported upon as having been tested with great success in Berlin. It is called the 'Telescriptor,' by which we may at once assume that it delivers a written message, instead of one which must be translated from the signals of a moving needle, as in the commonly-used form of telegraphic apparatus. It seems, indeed, to take the form of an electric typewriter, with a keyboard upon which the message is fingered out by the sender, and a receiving instrument where it appears in type. The circumstance that Messrs Siemens and Halske have obtained the sole rights of

manufacture in Germany is a testimonial in favour of the new invention; but it must be remembered that several forms of writing and printing telegraphic messages have from time to time been brought forward, some of them most ingenious in design and effective in operation. They are, however, only known to students of telegraphy as machines which promised much but did not displace existing arrangements.

THE HANDMAID OF EXPLORATION.

Professor Flinders Petrie, the well-known Egyptologist, has made good use of the photographic camera in the course of his work, and lately, at the Camera Club, London, delivered a lecture under the title, 'Photography the Handmaid of Exploration.' He explained that it was particularly desirable to secure trustworthy records of all his Egyptian 'finds,' because the government exercised the very reasonable right of retaining for their own museum at Gizeh the pick of the objects discovered. His photographic work was accomplished under great difficulties, for he had a small army of men to govern, books to keep, and often had to do his own cooking, besides taking an active part in the actual labour of excavating. This left him little time for photography, and the pictures when taken had to be developed with a minimum allowance of water, that necessary being exceedingly scarce. In spite of these obstacles Professor Petrie was able to exhibit a fine collection of pictures, some of them representing objects which were at least five thousand five hundred years old. The wonderful state of preservation existing in things which we generally regard as perishable is due to the peculiar property of the dry sand in which they have been buried for so long. Thus, a workman's basket, with the original cords attached, was in as good a condition as when used fifty centuries ago; and the same may be said of specimens of papyrus of the same age, which are totally unchanged. Professor Petrie spoke well of his Egyptian workpeople, who would labour hard and willingly with encouragement and kindness.

ARCTIC EXPLORATION.

The good ship *Fram*, which carried Nansen on his memorable voyage to the polar seas, is to sail northward once more in June 1898, under command of Captain Sverdrup. This new polar expedition is organised under the auspices of the Norwegian government, who, besides lending the *Fram*, contribute liberally to the enterprise. The ship is now being overhauled and altered by Colin Archer, the Scotsman who built her, this being necessary in consequence of the larger number of both men and dogs which will accompany the expedition. Captain Sverdrup has far more applications from volunteers wishing to embark with him than he can listen to, and

among the number are many Norwegians of scientific attainments. The *Fram* will proceed through Smith's Sound, and will then sail along the north-western coast of Greenland until stopped by ice. Here she will take up her winter quarters, and expeditions in sledges will be sent to explore Northern Greenland and to ascertain the extent of the ice-floes. It is hoped that the voyage will not extend over two years; but food for double that period will be carried, in case of unforeseen need.

SEWAGE DISPOSAL: A NEW DEPARTURE.

For years it has been maintained that the sewage of London could be converted into a valuable fertiliser, and many systems have been experimented upon in this direction. But in the result it has been found better to take the 'sludge' fifty miles out to sea and there 'drown' it. The London County Council maintains a fleet of six vessels for this service; they carry on each journey a load of nearly one thousand tons of sludge, and made last year more than two thousand trips at a cost of upwards of £30,000. Now a new plan altogether is to be tried, and works are being pushed forward at Rotherhithe, where the method is to be tested. This new system aims at the conversion of the sludge into good-burning furnace-fuel, so that what is now so costly to throw away may be converted into a valuable commodity. The method is known as the 'Henry process,' and consists in drying the sludge—which contains ninety per cent. of moisture—on the surface of huge revolving hot-air cylinders, scraping off the dry film formed, and pressing the residue into cakes ready for burning. It is also intended to grind some of the residue to a fine powder, and to sell it for fertilising purposes. The experiment is an interesting one, and its results will be looked forward to anxiously not only by the London County Council, but by the representatives of all our larger towns and cities.

THE LARGEST TELESCOPE.

It seems to be only in the natural course of events that America should wish to have, and should secure, the largest telescope ever constructed; and for some years this has been the proud boast of the famous Lick Observatory. But there seems to be no finality in these things, and the Lick telescope is now altogether eclipsed by that which stands in the recently-opened Yerkes Observatory, which is situated seventy-five miles from Chicago, at Lake Geneva, and one thousand two hundred feet above sea-level. The objective lens of this huge instrument, which is forty inches in diameter and which weighs in its mount no less than five hundred pounds, presents the usual combination of crown and flint glasses, and has been made by the celebrated firm of Alvan Clark & Sons, of Boston. The steel

tube in which it fits, which forms the body of the instrument, is sixty feet long and weighs six tons. The entire instrument weighs twenty tons, and this mass has to be kept in motion by the action of clockwork, so as to keep pace with the rotation of the earth. The other necessary movements are secured by electric motors, so that the observer can point the huge instrument at any celestial object by the pressure of a button.

PRECAUTIONS AGAINST EARTHQUAKE SHOCK.

In the year 1857 there occurred a terrible earthquake in Italy, which destroyed several villages and killed ten thousand human beings. A full account of this disaster may be found in a book by Robert Mallet, who went from place to place and fully studied the phenomena exhibited. He writes of the catastrophe as 'an appalling mass of human misery, almost the whole of which was preventable by the exercise of proper care in choice of methods of house-construction in the earthquake region, and future repetitions of which might thus be completely avoided.' It is curious to note that Professor Milne, the leading earthquake-authority to-day, is saying exactly the same thing with regard to the recent earthquake in Assam, by which fifteen hundred lives were lost and an enormous amount of property destroyed. He points out that Japan has suffered from far more severe earthquakes; but that, profiting by experience and guided by experiment, the engineers there, with their European colleagues, have gradually departed from the stereotyped system of building-construction in vogue in other countries. The result is that new buildings resist earthquake shock, while the old ones are gradually disappearing. The wise Japanese spend a large sum annually to assist a committee in investigating earthquake phenomena, a professor is employed at their university to lecture upon the best methods of building-construction in earthquake districts, and they have sent a special commissioner to Assam to report upon the recent earthquake there. Professor Milne urges the government of India to take a lesson from Japan.

THE CHINESE OIL-TREE.

In a recent report of the U.S. consul-general at Shanghai there is an interesting description of the Tung, or Chinese oil-tree. This useful tree grows to a height of about fifteen feet, and is of beautiful appearance, its leaves being vivid green and its flowers a pink-white. The seeds are poisonous, and it is from them that the oil is extracted in the most primitive fashion by wooden presses worked with wedges. The oil thus obtained is largely used all over the country in the manufacture of paint and varnish, for waterproofing paper and umbrellas, and in some districts for illuminating purposes. But its chief use is for caulking boats. On the submerged parts of vessels it is applied hot, but on other parts it is

painted on in thin coats quite cold. All Chinese boats are thus oiled twice a month, and so are made to assume a glossy appearance, while the wood is greatly preserved. Like most other commodities, this tree-oil is often adulterated before it is sold by retailers—chiefly with cotton-seed oil.

A WEST INDIAN FRUIT.

There is every reason to suppose that before long a most delicious fruit, new to Britain, will be obtainable in our markets. This is the mangosteen, a native of the Moluccas, and cultivated in Java and Ceylon. It has now been successfully grown in the West Indies, in proof whereof an experimental case of the fruit from there has recently arrived in excellent condition in London. The mangosteen is spherical in form and about the size of a small orange. When the rind has been removed a juicy pulp—as white and soluble as snow—is revealed, and this has a most delicious flavour, reminding one of the finest nectarine, with a dash of the strawberry and pineapple combined. It is interesting to note that this present from the West Indies is but a return for benefits received, for the original plants which are now bearing fruit were sent thither from our own Kew Gardens.

PIERCING IRON WITH CLAY.

We have all heard of the old experiment of firing a tallow-candle from a gun through the panel of a door, and can easily imagine the feasibility of the feat, for door-panels are usually very thin and of soft wood. It is far more difficult to believe in the possibility of using a lump of clay as a projectile to penetrate an inch-thick iron target; but this has recently been done at Woolwich Arsenal in the course of some experiments for the purpose of ascertaining the condition under which gas is fired in mines. A special form of gun was employed to represent a bore-hole, and cylinders of clay were used to imitate the tamping. Shots were fired in various explosive mixtures of gas and air, coal-dust, &c.; and, at a distance of twenty-five feet from the gun, an inch-thick iron target was placed at an angle, so that the clay could be broken up into dust and scattered upwards. After the first three or four shots it was found that the clay had gone right through the metal, and the hole was gradually enlarged by subsequent impacts.

A NEW TYPE-COMPOSING MACHINE.

An enormous amount of ingenuity has been expended upon type-composing machines—much of which has, unfortunately, brought no return for the labour and thought involved in the work. After years of competition the Linotype machine—which casts type line by line—seemed to represent the survival of the fittest. But it is now threatened by a serious rival in the Monotype, a recent American invention, which is being taken

up in this country. The Monotype really comprises two machines—one of the typewriter form which punches holes in a ribbon of paper, and the other the casting-machine, which is operated by the slip so perforated. An expert operator can perforate, it is said, about fifty words a minute, and the type-casting machine—which is purely automatic—will turn out from 7000 to 10,000 letters an hour. It is claimed for this machine that, the types being separate, corrections can be as easily made as in the case of hand-set copy, and that one mechanic can look after eight or ten machines.

[The Editor regrets having printed in the number for October 9 a mutilated copy of Adelaide A. Proctor's *A Woman's Answer*, which was sent in, accepted, and paid for as an original contribution. When an explanation was demanded, the sender of the verses could only give the unsatisfactory reply that the poem had been bequeathed to him, with other papers, by a friend now deceased.]

TO A GIRTON GIRL.

(A RONDEAU.)

I LOVED you once, two years ago;
Then you were seventeen. I know
Your blue eyes matched the summer sky,
Your voice was like a melody.
You smiled, sweet, when I told you so.

But now no glances you bestow
Upon me when I whisper low.
I can't forget, although I try,
I loved you once.

Your head is full of Cicero,
As leisurely to class you go.
Since you've learnt Greek you pass me by,
You are a Girton girl, and I
Am but a frail, weak man. But, oh !

I loved you once.

SISSIE HUNTER.

'THE BULLY OF HAIPHONG,'

BY GUY BOOTHBY,

unavoidably held over from this Part, will appear in next issue.

* * * TO CONTRIBUTORS.

- 1st. All communications should be addressed 'To the Editor, 339 High Street, Edinburgh.'
- 2d. For its return in case of ineligibility, postage-stamps should accompany every manuscript.
- 3d. To secure their safe return if ineligible, ALL MANUSCRIPTS, whether accompanied by a letter of advice or otherwise, should have the writer's Name and Address written upon them IN FULL.
- 4th. Poetical contributions should invariably be accompanied by a stamped and directed envelope.

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